Title: An exercise device.

DESCRIPTION

The present invention relates to a new exercise device, particularly but not exclusively for use in confined spaces.

Recently, there has been growing concern at the frequency of occurrence of Deep Vein Thrombosis (DVT) in individuals that have been subjected to a confined space for long periods, most notably on long haul flights. The condition has been highlighted in both the medical and popular press and is generally referred to as "Economy Class Syndrome". DVT is a potentially fatal condition wherein a blood clot forms and later breaks up and migrates to a different part of the body, possibly occluding vessels and restricting blood flow to a major organ.

A recent report by medical staff at Ashford Hospital suggests that as many as one person per month may be dying as a result of DVT after a long haul flight into Heathrow airport alone. However, the mortality and morbidity rates associated with DVT linked to long haul flights may be an even greater problem than this suggests due to many of the physical consequences of DVT not presenting themselves until days and possibly weeks after a flight.

Many factors contribute to the risk of an individual developing DVT during or following a long haul flight, such as the individual's

health, body weight, exercise, diet, fluid and alcohol intake. The use of the contraceptive pill has also been linked to DVT. Long haul flights increase the risk of DVT due to passengers sitting for prolonged periods of time in cramped conditions without regular exercise. This results in blood flow in the legs becoming stagnated which can lead to the development of DVT. This may be further compounded by the seats of the aircraft which may constrict the vessels at the back of the knee, further restricting blood flow.

It has now been recognized that regular exercise should be taken by passengers during a long flight and indeed, responsible airlines recommend this. Passengers are advised to stand up and walk every hour but it is often difficult to move about on a plane, due to the restricted aisles and the large number of passengers that are normally present on the flight. Regular exercise is particularly difficult for passengers occupying seats away from the aisle. Furthermore, it is not safe to walk about on a plane if turbulence is being experienced during the flight. As a result, many airlines now provide advice of how to exercise whilst remaining seated. The exercises prescribed are to rotate and flex the ankles and move legs and feet as much as possible in the seated position. Whilst such exercises can help, the absence of any resistance to the movement means that the exercise is not particularly demanding and may not simulate the natural action of walking which

provides a pressure pump from the foot and calf to create more significant blood flow through the feet and legs.

Additionally, individuals that have suffered from injury or strokes often have to relearn how to control their muscle groups. This is generally achieved by attendance at regular physiotherapy sessions. However, it would be beneficial to provide the patient with an exercise device that may be used at such sessions or at home to help in the coordination and rehabilitation process.

It is an object of the present invention to provide an exercise device that may be used in confined spaces, thereby overcoming, or at least alleviating the abovementioned drawbacks.

It is a further object of the present invention to provide an exercise device that will assist in an individual developing their coordination.

Accordingly, the present invention provides an exercise device, particularly but not exclusively for use in a confined space, the device comprising at least two chambers in fluid communication with each other, means for introducing fluid into at least one of the chambers and variable resistance means to hinder the flow of fluid from one chamber to the other whereby application of pressure to one chamber is required to cause movement of fluid from that chamber to the other chamber.

The fluid is preferably air and may be introduced into the chamber by means of blowing air through a valve provided in the chamber or by

other suitable pumping means. Preferably, the valve is provided with a mouthpiece. Alternatively, another type of fluid may be used, such as a viscous liquid.

Preferably, the two chambers are formed from a single chamber that is substantially divided in two by the provision of two or more dividers between the two chambers, such as lines of heat weld or high frequency bonding. Each divider is provided with a gap that allows the flow of fluid from one chamber to the other but, due its restricted size, creates resistance to the flow. A channel is formed by the dividers between the two chambers. Preferably, the dividers are provided with the gaps at different points along their length, for example, at opposing ends. This causes air from one chamber to enter the channel between the dividers and exit through the gap at the other end of the channel. This, combined with the material of construction of the device, ensures that a variable resistance is provided by the device. More preferably, three dividers are provided, the central divider having a gap for the passage of fluid at the opposite end to the two dividers either side thereof. Two channels are formed between the three dividers for the flow of fluid therealong.

Alternatively or additionally, a variable resistance valve may be employed to provide variable resistance to the flow of fluid between the

chambers, for example in the form of a membrane between the two chambers.

The device may be of any shape and dimension but preferably is in the form of a pillow or cushion. Advertising material or other printed matter may be provided on the outer surface of the device. Suitable packaging may also be provided for easy storage of the device in its deflated state.

It is important for the device to be made of a material that can withstand the pressure to be applied thereto and does not deteriorate when exposed to the pressures experienced in flight. Additionally, the material should preferably allow the application of printing ink thereto. Ideally, a 200 micron laminate PVC is used. The material must also be sufficiently flexible to allow the chambers to partially distend at high pressure, thus enhancing variable resistance.

For a better understanding of the present invention and to show more clearly how it may be carried into effect, reference will now be made by way of example only to the accompanying drawings, in which:-

Figure 1 is an external view of an exercise device according to one embodiment of the present invention;

Figure 2 is a cross sectional view through the exercise device of Figure 1; and

Figure 3 is a cross sectional view through an exercise device according to a second embodiment of the present invention.

Referring to Figures 1 and 2 of the accompanying drawings, an exercise device 2 according to one embodiment of the present invention is illustrated. The device comprises an inflated cushion that is split substantially into two chambers 4, 6 by the provision of three lines of parallel welding 22, 24, 26 substantially through the centre of the device. The two outer welds terminate prior to the same wall of the device to provide gaps 28, 30 and the central weld 24 terminates prior to the opposing wall of the device to provide a further gap 32. In this manner, the air has to flow along the two channels created between the welds, as indicated by the arrows shown in Figure 2 thereby providing variable resistance. The cushion is also provided with an inflation valve 10 and the outer surface of the cushion may be provided with advertising 14 or other printed material, such as details of the company that has sponsored the provision of the exercise device or information on a particular flight destination.

In this manner, a flat-packed cushion may be provided which is inflated prior to use by blowing air through the inflation valve 10 or by using other suitable inflation means, such as a pump, to inflate a first chamber of the cushion. The device may then be used as a foot pump to exercise the legs and feet of an individual. The application of pressure to

the inflated chamber by pressing with one foot onto the chamber causes air to be displaced from this chamber to the opposite second chamber. The small area of the air gap relative to the volume of the chamber and the small channels through which the air has to flow between chambers creates resistance against the movement of the air requiring additional effort to be employed in order to deflate the first chamber and inflate the opposite chamber. The other foot may than act on the inflated second chamber to push air back into the first chamber thereby exercising both the legs and feet of the individual to increase blood flow. Hence, the device can be placed on the floor in a confined area and each foot may press down on its respective chamber alternately thus simulating a walking or pedaling motion.

It is to be appreciated that the device may be provided in various shapes and/or sizes and different types of means may be provided for creating the variable resistance to the movement of the air between the chambers. Figure 3 of the accompanying drawings illustrates an alternative arrangement. For the sake of simplicity, identical features already described in relation to Figures 1 and 2 are given the same reference numerals and only the differences will be discussed in detail. The device has only one channel created through the centre of the cushion by the provision of two weld lines 40, 42 which each have a gap 44, 46 therein provided at opposing ends of the lines.

The device according to the present invention offers both resistance to exercise against the foot and changes the resistance on the sole of the foot which mimics the pressure that is applied to a foot when walking. The device is appropriate for all abilities since the harder and/or faster the chambers are pushed, the more strenuous the exercise.

The device may also be used to exercise the hands and arms by placing the half-inflated device on the lap and working the hands alternately on each of the chambers. Alternatively, the device may be used as a "stress ball" wherein it is squeezed by hand. Furthermore, the half- or fully inflated device may be placed behind the knee to soften the edge of hard seats, again assisting in the reduction of constriction of blood vessels and improving comfort.

The device may be made of a lightweight, airtight material that is sufficiently strong to withstand the pressures exerted thereon. A preferred material is 200 micron laminate PVC. Such a material also allows for advertising material to be printed thereon.

It is clear that the device is particularly suitable for use on long haul flights where space is very limited. When deflated, the device may be folded up to occupy a minimal amount of space. Alternatively, the fully inflated device may be used as a small travel pillow.

The device according to the present invention enables passengers to be provided with an exercise machine that may be used in a confined

space. It is to be appreciated that the provision of, for example, a foot pedal, for operation by passengers would not be acceptable since it would be too bulky to place under the seat of a plane, would be too heavy and would be a safety hazard in the event of evacuation of the plane. It is likely that the cost of such a device would also be prohibitive to supplying a device for every seat. In contrast, the device of the present invention overcomes these problems, being a cheap, small, simple, lightweight and safe device for use on aeroplanes or in other confined spaces.

Furthermore, the use of the exercise device is not limited to confined spaces such as aeroplanes. For example, the device may be used as an exercise device for the rehabilitation and improvement of coordination of patients that have suffered an injury or possibly a stroke. A patient that has had a stroke suffers from paralysis and has to relearn how to control their muscle groups. The use of the device of the present invention to push on one side and then the other to inflate alternative sides of the device may help coordination and the rehabilitation process. Similarly, such a device may be used by children experiencing coordination difficulties.